

Unit Planning Guide: Grade 9 Unit 5 of 8

Unit Title: Quadratic Expressions and Equations	Pacing (Duration of Unit): 5 weeks
Grade: 9	Buffer Day(s):

Desired Results

Transfer Goals

Students will be able to independently use their learning to:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Established Goals (2011 MA Curriculum Frameworks Standards Incorporating the Common Core State Standards)

Standards (Priority Standards in bold):

- **A-REI.4a,b,c** Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b . Demonstrate an understanding of the equivalence of factoring, completing the square, or using the quadratic formula to solve quadratic equations.
- **A-SSE.2** Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
- **A-SSE.3a** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Factor a quadratic expression to reveal the zeros of the function it defines.
- **A-SSE.3b** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
- **F-IF.7**, a,b Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

WiDA Standards (ELL)

Standard 1: ELLs **communicate** for **Social** and **Instructional** purposes within the school setting
Standard 3: ELLs **communicate** information, ideas and concepts necessary for academic success in the content area of **Mathematics**

In the lesson planning stage, teachers will need to differentiate lessons for ELLs. In order to accomplish this they will need: 1.) this curriculum map, 2.) a list of their ELLs and their proficiency levels, and 3.)

- **F-IF.8a Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.**
- S-ID.6a Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.

appropriate language function expectations and scaffolds or supports.

To be completed in collaboration with the ELL Department

Meaning (*Mostly assessed through Performance Tasks/Assessments)

Big Ideas: (Statements and concepts written in teacher friendly language which reflect the important [but not obvious] generalizations we want students to be able to arrive at. These are used by the teacher to focus daily instruction.)

- To be able to solve a quadratic equation
- To be able to graph a quadratic equation
- Using quadratic equations to model real world situations

Essential Questions: (Questions which frame ongoing and important inquiries about the big ideas. They are written for students and used in daily instruction to help engage students in meaningful thinking.)

- What characteristics of the graph of a quadratic function distinguish it from that of a linear function?
- How can you find a solution to a quadratic equation algebraically and graphically?
- How would you recognize a situation when a quadratic equation should be solved by extracting the square root?

Acquisition (*Mostly assessed through traditional summative assessments)

Knowledge: Key basic concepts, facts, and key terms (written in phrases) students should be able to recall independently.

Students will know ...

- Identify Quadratic Function from a second difference in a table
- Identify and define the following key terms: Parabola, Vertex Parent function, Translation, Transformation, Reflection, Zero product property, Real roots of an Equation, Axis of Symmetry, Completing the square, Quadratic formula
- Know how to interpret the discriminant

Skills: The discrete skills and process students should be able to use independently (Bloom's Level of Learning should be noted in parentheses.)

Students will be skilled at:

- Applying factoring
- Graphing a quadratic equation
- Identify vertex
- Solving Quadratic Equation with leading coefficient other than one
- Recognizing positive/negative
- Factoring and find roots
- Identifying a vertex
- Finding the line of symmetry
- Finding the zeros
- Using the quadratic formula
- Applying the quadratic formula